

S P E C I F I C A T I O N

Docket No. 5873.38012

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, **Hui Suk Park**, a citizen of the Republic of Korea, have invented new and useful improvements in a:

METHOD AND APPARATUS FOR ATTACHING SUPPLEMENTAL HAIR TO HUMAN HAIR

of which the following is a specification:

METHOD AND APPARATUS FOR ATTACHING SUPPLEMENTAL HAIR TO HUMAN HAIR

Cross Reference to Related Application

This application is a continuation of application number 10/159,094
5 filed May 30, 2002, now U.S. patent number _____, which is
incorporated herein by this reference.

Background of the Invention

Field of the Invention

The present invention relates generally to hair extension and
10 adornment, and more particularly to a method and apparatus for attaching
supplemental hair to human hair to produce longer hair length or greater
hair volume.

Description of the Prior Art

Frequently, a person may wish to supplement their own natural hair
15 with supplemental hair in order to lengthen or increase the volume of hair in
order to change their appearance or try on a new fashionable hair style.
Thus, a person with short hair, or a person with sparse hair, may have a
hair style that requires longer hair, or greater hair volume. The supplemental
hair may be made of natural human hair or synthetic fibers made to look
20 like natural human hair.

In the prior art, supplemental hair strands may be attached or bonded to natural hair by several methods, such as tying, weaving, or gluing the supplemental hair to the person's natural hair.

5 An example of attaching supplemental hair by weaving or braiding is disclosed in U.S. Patent No. 4,982,748 issued to Trimarchi. Trimarchi discloses intertwining or braiding of natural and synthetic hair followed by wrapping the braided portion of natural and synthetic hair with a portion of synthetic hair, which is then coated with a heat-hardenable sealer. Heat is applied to the wrapped braid using a pair of tipped members, which are adapted for mounting on the arms of a conventional heated curling iron. The
10 tipped members include pointed portions and opposing flat surfaces for applying heat.

U.S. Patent No. 4,934,387 issued to Magna discloses a method for lengthening hair by gluing supplemental hair to natural hair with
15 thermoplastic adhesives dispensed from a glue gun. One problem with the Magna invention is that bundles of supplemental hair are not glued prior to gluing the supplemental hair bundled to the natural hair, which makes the Magna process difficult because a glue gun, the supplemental hair bundle, and the natural hair must all be manipulated simultaneously in a manner
20 that may prove difficult for the operator.

U.S. Patent No. 5,107,867 issued to Barrington shows supplemental hair plugs bonded by a thermostable adhesive, and coated with a thermosetting adhesive. The plug of supplemental hair is inserted into a small segment of heat shrinkable tubing with natural hair, and heat is
25 applied to the heat shrinkable tubing so that the thermosetting adhesive liquefies and joins the plug of supplemental hair and natural hair while being compressed and sealed by the heat shrinkable tubing. The process shown in Barrington has the disadvantage of being tedious, awkward, and time consuming because hair plugs are bonded with two different materials

and segments of heat shrinkable tubing are awkwardly threaded along the length of a bundle of a person's natural hair.

U.S. Patent No. 5,072,745 issued to Cheh shows a bundle of supplemental hair joined together by hot melt adhesive. The supplemental hair bundle is bonded to a person's growing hair using an application tool to melt and dispense the adhesive. Disadvantages of Cheh include the inaccuracy in quantity of glue dispensed and the difficulty in evenly dispersing the glue that is initially deposited on only a few of the strands to be bonded.

The hair extension and adornment techniques known in the prior art have the problem of requiring extraordinary dexterity in the person applying the supplemental hair because supplemental hair bundles and sections of natural hair are difficult to bond using heat sources that do not assist in holding and mixing the combination of natural hair, supplemental hair, and thermoplastic adhesive.

Therefore, there is a need for an improved method and system for applying supplemental hair to natural human hair that provides tools and techniques that make it easier for the person applying the supplemental hair.

Summary of the Invention

The invention is directed to a method and apparatus for attaching supplemental hair to natural human hair. The method begins with selecting a plurality of strands of human hair growing from a scalp. A supplemental hair bundle, which includes a plurality of supplemental hair strands previously glued to one another at a glued portion by thermoplastic glue, is fused using a heating element of an applicator. The glued portion of the supplemental hair bundle is then contacted to the selected plurality of strands of human hair. The heating element may be a heated jaw having a

heating channel shaped to receive and heat the glued portion of the bundle. A kneading jaw having a kneading ridge in opposing relationship to the heating channel of the heating jaw may be used to clamp the human hair and the supplemental hair bundle, and to supply a manipulating force to
5 mix the glue into the strands of human hair. Bundles are made by placing supplemental hair strands in a film of melted or fused glue coating the outer surface of a rotating cylinder that is partially submerged in a reservoir of fused glue.

Brief Description of the Drawings

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which like
5 numbers designate like parts, and in which:

Fig. 1 depicts the attachment of a supplemental hair bundle to a selected plurality of strands of human hair using a supplemental hair applicator in accordance with the method and apparatus of the present invention;

10 **Fig. 2** is a side view of a supplemental hair bundle;

Fig. 3 is an end view of a supplemental hair bundle;

Fig. 4 depicts the supplemental hair applicator of the present invention in an open position;

15 **Fig. 5** illustrates the supplemental hair applicator of the present invention in a closed position;

Figs. 6 and 7 are isometric views of the jaws of the supplemental hair applicator of **Figs. 4 and 5**;

20 **Figs. 8, 9, and 10** more clearly illustrate the process of attaching a supplemental hair bundle to a selected plurality of strands of human hair using the supplemental hair applicator in accordance with the method and apparatus of the present invention; and

Fig. 11 depicts a method and apparatus for making a supplemental hair bundle accordance with the present invention.

Description of the Preferred Embodiments

With reference now to the drawings, and in particular with reference to **Fig. 1**, there is depicted the attachment of a supplemental hair bundle to a selected plurality of strands of human hair using a supplemental hair applicator in accordance with the method and apparatus of the present invention. As shown, supplemental hair bundle **20** is being attached, in general to natural human hair **22** growing from scalp **24**, and more specifically, to a selected plurality of strands of human hair **26**. Supplemental hair applicator **28** is used to fuse and knead a glued portion of supplemental hair bundle **20** using specially designed jaws, which are discussed in greater detail below.

The method of attaching supplemental hair of the present invention is easier than methods of the prior art because an operator in a salon or beauty parlor performs fewer steps and simultaneously manipulates fewer objects, making the method of the present invention faster and more profitable for the operators. In the method of the present invention, the operator may hold in one hand the supplemental hair bundle **20** aligned with strands of human hair **26**, and hold in the other hand supplemental hair applicator **28**. As explained in greater detail below, the jaws of supplemental hair applicator **28** heat the thermoplastic glue of supplemental hair bundle **20** and hold both natural and supplemental hair strands in alignment as the heated glue and hair are kneaded or manipulated to mix and distribute the softened or melted glue so that it contacts and adheres to many of the hair strands.

With reference now to **Fig. 2**, there is depicted a more detailed view of supplemental hair bundle **20**. Glued portion **30** of supplemental hair bundle **20** glues strands of the bundle to each other with thermoplastic glue that softens or fuses above a predetermined temperature to a workable viscosity, and then solidifies or hardens as it cools. In a preferred embodiment, the

thermoplastic glue is an ethylene-vinyl acetate (EVA) glue, with the following characteristics: a curing time of 0.3 to 0.5 seconds; a softening point (circular ball method) of $\geq 108^{\circ}\text{C}$; a recommended operating temperature of 160°C – 180°C , wherein the glue is in a fluid state; a melt viscosity of 3000 mPa·s (millipascal second) at 140°C , 1450 mPa·s at 160°C , and 800 mPa·s at 180°C ; a peel stress of $\geq 370\text{N/C m}^2$. To conceal the glue, a glue tinted the color of supplemental hair bundle **20** may be used.

Glued portion **30** is preferably cylindrically shaped, with a diameter of about 0.1 inches, and a length of about 0.5 inches. The dimensions of glued portion **30** are not critical, and may vary from one supplemental hair bundle **20** to another.

Fig. 3 shows an end view of glued portion **30**, while not showing strands of supplemental hair in the background. As illustrated, glued portion **30** is round, and the ends of strands of supplemental hair are distributed throughout. Alternatively, glued portion **30** may be another shape, depending upon how it is manufactured. For example, glued portion **30** may be square, triangular, or diamond-shaped. Supplemental hair bundles **20** typically include, for example, from 50 to 60 hair strands, although the number of hair strands can be more or fewer. Length of the strands typically ranges from 3 inches to 40 inches, although again, the length can be longer or shorter.

Referring now to **Fig. 4**, there is illustrated a more detailed view of supplemental hair applicator **28** of the present invention. As illustrated, supplemental hair applicator **28** is in an open position, wherein heated jaw **40** and kneading jaw **42** are separated. Heated jaw **40** is mounted to heated jaw arm **44** on jaw end **46** of jaw arm **44**. Kneading jaw **42** is mounted to kneading jaw arm **48** on jaw end **50** of jaw arm **44**. Pivot end **52** of heated jaw arm **44** and pivot end **54** of kneading jaw arm **48** are pivotally connected by hinge joint **56**. Hinge joint **56** preferably has a limited range of opening of

about 10°, and is biased in the open position by a spring (not shown), which may be an integral part of hinge joint **56**.

According to an important aspect of the present invention, heated jaw **40** includes heating channel **58**, which extends into inside surface **60** of heated jaw **40**. In a preferred embodiment, heating channel **58** is half-cylinder-shaped, extending across heated jaw **40** with an axis parallel to a rotational axis of hinge joint **56**. Heating channel **58** is adapted to receive and apply heat to glued portion **30** of bundle of supplemental hair **20**, and thus the shape corresponds to the shape of glued portion **30**, which means for this embodiment, it has a length and radius approximately equal to the length and radius of glued portion **30**. If glued portion **30** was a different shape, then heating channel **58** may also be different, preferably having a corresponding shape that efficiently transfers heat to glued portion **30**. When power is supplied to supplemental hair applicator **28**, heating channel **58** reaches a temperature that is sufficient to soften and make the glue of glued portion **30** adhere to strands of human hair **26**, which is preferably 182.2°C (360°F). Power for heating heated jaw **40** may be provided by a cord plugged into a typical alternating-current electrical wall plug, similar to that used for a curling iron for hair.

Although both jaws of supplemental hair applicator **28** may be heated, in a preferred embodiment, heated jaw **40** is the only jaw that gets hot. The half-cylinder shape that conforms to the radius and length of glued portion **30** efficiently transfers enough heat to fuse or melt the thermoplastic glue. Having only one jaw heated reduces the likelihood of burning someone.

In an opposing relationship to heated jaw **40** and heating channel **58**, kneading jaw **42** includes kneading ridge **62**, which extends above inside surface **64** of kneading jaw **42**. In a preferred embodiment, kneading ridge **62** is also half-cylinder-shaped, extending across kneading jaw **42** with an axis parallel to a rotational axis of hinge joint **56**. One purpose of kneading ridge **62** is to provide a kneading surface to distribute melted glue among

strands of human hair **26** and supplemental hair **20**. Kneading ridge **62** clamps the strands of natural and supplemental hair, and works the glue and strands of natural and supplemental hair into a mass by manipulating and massaging the strands and glue, and as a result, the glue will coat and
5 adhere to most, if not all, the strands.

Turning now to **Fig. 5**, supplemental hair applicator **28** is shown in a closed position, wherein heated jaw **40** and kneading jaw **42** are together. In this preferred embodiment, heating channel **58** and kneading ridge **62** are aligned with each other, wherein the axes of heating channel **58** and
10 kneading ridge **62** are substantially parallel (at least when supplemental hair applicator **28** is closed), and wherein heating channel **58** and kneading ridge **62** are located about the same distance from hinge joint **56**. In this preferred embodiment, kneading ridge **62** extends into heating channel **58** when supplemental hair applicator **28** is closed, which allows kneading ridge
15 **62** to apply greater force to glued portion **30**, and human hair **26** and supplemental hair **20**.

The surfaces of heated jaw **40** and kneading jaw **42** are preferably coated with a material that is relatively non-sticky with respect to the thermoplastic glue in glued portion **30**. For example, the outside surface of
20 heated jaw **40** and kneading jaw **42** may be a non-stick coating. Examples of commercially available non-stick coatings are sold under the trademarks TEFLON® or SILVERSTONE® by E.I. du Pont de Nemours and Company.

The isometric views of **Figs. 6** and **7** more clearly show the structure and relationship between heated jaw **40** and kneading jaw **42**, and more
25 specifically between heating channel **58** and kneading ridge **62**. Heating channel **58** is concave, extending into and across inside surface **60** of heated jaw **40**. Kneading ridge **62** is convex, extending outward and across inside surface **64** of kneading jaw **42**.

In an alternative embodiment of the present invention, the axes of heating channel **58** and kneading ridge **62** may be askew from being parallel to the rotational axis of hinge joint **56** when supplemental hair applicator **28** is closed. If such a different angle is used, it may still be beneficial to keep
5 the axes parallel (when the applicator is closed) and opposingly aligned with each other so that they meet when the applicator is closed, and cooperate to knead glued portion **30**, human hair **26**, and supplemental hair **20**.

In another embodiment, supplemental hair applicator **28** may be implemented by adding specialized tips to an existing curling iron. Such tips
10 may be similar to heated jaw **40** and kneading jaw **42**, wherein heated jaw **40** may be coupled to the heated portion of the curling iron to collect heat, and kneading jaw **42** may be coupled to the non-heated, pivoting portion of a curling iron.

Referring now to **Figs. 8, 9, and 10**, the operation of attaching
15 supplemental hair to natural human hair is more clearly illustrated with the views along the axes of the strands of human and supplemental hair. After plugging in supplemental hair applicator **28** and allowing it to reach operating temperature, the operator selects a plurality of strands of natural human hair **22** growing from a scalp (not shown here). The operator then
20 places glued portion **30** in heating channel **58** to soften or melt glued portion **30** of a supplemental hair bundle **20**. For convenience, and to reduce the amount of handling required, the supplemental hair strands of the supplemental hair bundle have been previously glued to one another at the glued portion by thermoplastic glue. The heat source is applied by heating
25 channel **58** of heated jaw **40**. Once the glue is sufficiently melted and viscous, the operator contacts the glued portion of the supplemental hair bundle to the selected plurality of strands of human hair, as illustrated in **Fig. 9**.

After contacting the glued portion and the strands of human hair, the operator mixes melted glue in glued portion **30** of the supplemental hair bundle **20** into selected plurality of strands of human hair **22** by closing kneading jaw **42** of supplemental hair applicator **28** so that kneading ridge **62** on kneading jaw **42** moves toward heating channel **58** and contacts glued portion **30** and selected plurality of strands of human hair **22**. As shown in **Fig. 10**, glued portion **30** is distorted, and glue is forced into contact with selected plurality of strands of human hair **22**. This mixing and kneading process may include repeated openings and closings of jaws **40** and **42**, and may include rotating the bundles of strands of natural and supplemental hair to knead at different angles.

After the mixing step, the operator may finish the attaching by kneading and manipulating the glued area by hand using his or her fingertips. When manipulating, the operator may roll the glued area to produce a smooth, rounded glued area that feels and styles better.

In an alternative method, glued portion **30** may be heated simultaneously with plurality of strands of natural human hair **22**. That is, glued portion **30** may be located in heating channel **58** and overlaid with strands of human hair **22**. Jaws **40** and **42** may then be closed to clamp down for a few moments as the glue softens and begins to mix with the natural human hair.

With regard to **Fig. 11**, there is depicted a method and apparatus for making a supplemental hair bundle in accordance with the present invention. As shown, thermoplastic glue **80** is melted in glue reservoir **82** by applying heat from reservoir heater **84**. Rotating cylinder **86** is partially submerged in melted thermoplastic glue **80** so that a fresh, hot film of melted thermoplastic glue **88** coats a non-submerged portion of rotating cylinder **86** as it turns.

The operator selects plurality of strands of supplemental hair **20** and arranges the strands so that they are substantially parallel and contacting adjacent strands to form a bunch with the ends that will be glued aligned with each other. Next, thermosetting adhesive is applied a to a portion of plurality of strands of supplemental hair (glued portion **30**) by touching the
5 portion of the plurality of strands to the film of melted thermoplastic glue **88**. Some rotation of the bunch may help coat the strands more evenly.

To finish the bundle, the operator may wish to use his or her fingertips to knead and manipulate the glued portion into a more cylindrical
10 shape with a smooth surface. Rolling the glued portion between fingertips may accomplish this finishing step. This method is a fast and efficient way to manufacture supplemental hair bundles **20**.

Rotating cylinder **86** may be supported by shaft **90**, which is coupled to motor **92** on one end and bearing **94** on the other. As is known by those
15 skilled in the art, pulleys, gears, chains, belts, and the like may be used to provide an appropriate turning force and speed for rotating cylinder **86**.

To allow for a variety of hair styles, and to accommodate people with different colored hair, supplemental hair bundles **20** may be manufactured in a variety of lengths and colors. The strands may be natural human hair,
20 synthetic hair, or a mixture of these. Strands in supplemental hair bundle **20** may be all the same color, or a mixture of colors to create a stylish look.

A kit for attaching supplemental hair to natural human hair according to the present invention includes a plurality of supplemental hair bundles, each containing a plurality of supplemental hair strands previously
25 glued to one another at a glued portion by thermoplastic glue, and a supplemental hair applicator. In a preferred embodiment of the kit, the supplemental hair bundles may be supplemental hair bundles **20** described herein. The supplemental hair applicator in the kit may be supplemental

hair applicator **28**, as described herein. The operator using the kit may reuse the supplemental hair applicator, and replenish the supply of supplemental hair bundles with new bundles.

5 The method and apparatus of the present invention has the advantage of making it easier for an operator to apply supplemental hair to natural human hair on a scalp by using supplemental hair strands previously glued to one another, and by aiding in the heating, aligning, and manipulating of the glue bond. Many of the prior art methods require awkward handling of glue applicators and parts to hold the glue bonded
10 area.

The foregoing description of a preferred embodiment of the invention has been presented for the purpose of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Obvious modifications or variations are possible in light of the
15 above teachings. The embodiment was chosen and described to provide the best illustration of the principles of the invention and its practical application, and to enable one of ordinary skill in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. All such modifications and
20 variations are within the scope of the invention as determined by the appended claims when interpreted in accordance with the breadth to which they are fairly, legally, and equitably entitled.